

6740970
10/540970

Rec'd PTO/PTO 29 JUN 2005

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
15 July 2004 (15.07.2004)

PCT

(10) International Publication Number
WO 2004/059092 A1

(51) International Patent Classification⁷: E02F 3/36 // 3/627, A01B 63/102

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number: PCT/SE2003/001772

(22) International Filing Date:
14 November 2003 (14.11.2003)

English

(84) Designated States (*regional*): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(25) Filing Language:

(26) Publication Language:

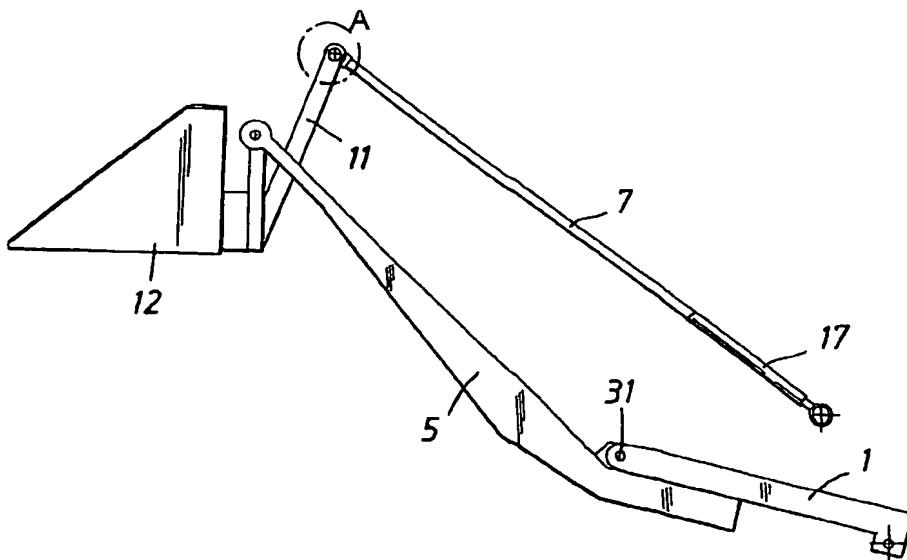
(30) Priority Data:
0203894-1 30 December 2002 (30.12.2002) SE

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A LOADER FOR AGRICULTURAL TRACTORS



(57) Abstract: A loader for agricultural tractors equipped with standard hydraulically manoeuvrable, parallel lifting arms (1, 2) which are pivotally mounted in the rear part of the tractor and provided with a centre attachment (3) in the tractor between the lifting arms, characterised in that the loader includes two parallel arms (5, 6) which are intended for attachment to respective lifting arms (1, 2) such as to extend rearwardly generally in the longitudinal direction of said lifting arms (1, 2); in that a centre rod (7) that can be extended hydraulically during operation extends outwardly from said centre attachment (3) parallel with the lifting arms; and in that respective arms (5, 6) and the outer end of the centre rod (7) are adapted for connection to a working implement or appliance (12).

WO 2004/059092 A1

BEST AVAILABLE COPY

A LOADER FOR AGRICULTURAL TRACTORS

The present invention relates to a loader for agricultural tractors.

5 One problem experienced on smaller farms resides in the need of a so-called front loader, i.e. a tractor-like vehicle that includes two externally mounted hydraulically manoeuvrable lifting arms for supporting a bucket or lifting forks or some other implement or appliance at their free ends.

10 The problem arises because the purchasing cost of such front loaders is too high in relation to the use of the vehicle, meaning that small farms are often forced to manage without the use of a front loader.

15 Agricultural tractors do not come equipped with externally mounted lifting arms and it is expensive to modify such a tractor by fitting it with such arms.

This problem is solved by the present invention, which provides a solution which enables a conventional tractor to be readily and cheaply fitted with a working implement or appliance so that the tractor can fulfil the function of a front loader.

20 The present invention thus relates to a loader for agricultural tractors equipped with standard hydraulically manoeuvrable, parallel lifting arms which are pivotally mounted in the rear part of the tractor and include a centre attachment in the tractor between the lifting arms, wherein the loader is characterised in that it includes two parallel arms which are intended to be attached in respective lifting arms such as to extend rearwardly generally in the longitudinal direction of said lifting arms; in that a centre rod that can be extended hydraulically during operation extends outwardly from said centre attachment parallel with the lifting arms; and in that respective arms and the outer end of the centre rod are intended for connection to a working implement or appliance.

25

30 The invention will now be described in more detail partially with reference to an exemplifying embodiment thereof illustrated in the accompanying drawings, in which

Figure 1 is a view of a tractor seen obliquely from the rear and including features according to the present invention;

Figure 2 is a perspective view of an inventive arrangement;

Figures 3 and 4 are respective views of the Figure 2 arrangement in different positions;

Figure 5 illustrates different lifting heights; and

Figure 6 illustrates different attachment points.

Both small and larger conventional tractors are equipped with standardised hydraulically manoeuvrable and parallel lifting arms attached to the rear part of the tractor. The arms are intended to support different working implements, such as ploughs, harrows, etc., and are able to raise and lower the same as required.

The invention relates to a loader for tractors equipped with such standardised hydraulically manoeuvrable parallel lifting arms 1, 2 pivotally attached in the rear part of the tractor and provided with a centre attachment 3 in the tractor 4 between said lifting arms 1, 2.

As will be apparent from Fig. 3, the inventive loader includes two parallel arms 5, 6 which are intended to be fastened in respective lifting arms 1, 2 so as to extend rearwardly out from the tractor generally in the longitudinal direction of the of the lifting arms 1, 2.

A centre rod 7 which can be extended hydraulically during operation extends outwards from the centre attachment 3 parallel with the lifting arms 1, 2 and with the arms 5, 6.

Respective arms 5, 6 and the outer end of the centre rod 7 are intended for connection to a working implement.

According to one preferred embodiment, respective arms 5, 6 and the outer end 8, 9, 10 of the centre rod 7 are intended for connection to an attachment 11 to which a working implement 12 shall be attached. The ends 8, 9, 10 are pivotally attached in the attachment whereas the implement is fixedly connected thereto.

Alternatively, respective arms 5, 6 and the outer end 8, 9; 10 of the centre rod 7 can be adapted for direct connection to a working implement.

The loader is made of a suitable steel material.

Although the working implement 12 is shown in the drawings in the form of a bucket or scoop, it will be understood that it may consist of any implement or appliance whatsoever, such as lifting forks, a lifting bar or rod for lifting cement pipes, a platform or snow plough. The present invention is therefore not restricted to any given form of implement. Neither is the invention restricted to any particular attachment design, since the person skilled in the art will be able to adapt the attachment means to the implement concerned.

10 The arms 5, 6 and the implement 12 are lifted in response to lifting of the lifting arms 1, 2. The implement can be tilted, i.e. swung about a horizontal axis, by changing the length of the centre rod.

15 The swing range of the standardised lifting arms is such that the arms will not define a sufficiently small angle with the vertical plane when raised to a maximum; see Fig. 5 which shows the lifting arm when swung up to its end position.

20 The arms 5, 6 are therefore bent upwards in a region 13, 14 outwardly of and close to the free ends 15, 16 of the lifting arms 1, 2. This achieves a high implement lifting height while allowing the implement to be lowered down onto the ground.

25 Figure 5 illustrates swinging of the loader in a vertical plane. In this case, the arms 5, 6 are designed for a lifting height of roughly 2.5 metres, which is sufficient for the majority of tasks on a typical farm. The lifting height can be increased by making the arms 5, 6 longer. However, longer arms will reduce the maximum load bearing capacity.

According to one preferred embodiment, the bending angle of the arms 5, 6 is adjustable, therewith enabling the maximum lifting height of the arms to be varied. In one simple embodiment, respective arms 5, 6 are divided and hinged about a joint 27, said arm parts being provided with holes 28 – 30, as shown in Fig. 5, for co-action with a pin (not shown) so as to hold the arms at the chosen bending angle.

According to one preferred embodiment there is provided at the outer end 8, 9 of respective arms a joint that functions to pivotally support an implement attachment means

or an implement. A joint for pivotal connection to an implement 12 is provided at the free end 10 of the centre rod 7.

5 In a preferred embodiment the centre rod 7 includes along its length an hydraulic piston-cylinder device which is used to change the length of the centre rod, said device being driven by the tractor's hydraulic system.

10 Preferably, the free end 10 of the centre rod 7 will include a number of attachment points 18 – 20 for co-action with the attachment (11) or an implement (12) at mutually different distances from the opposite end 21 of said rod. The attachment 11 may also be provided with different attachment points 22, 23, for attachment of the free end of the centre rod 7.

15 The centre attachment 3 is also preferably provided with a number attachment points 24 – 26 for co-action with the inner end of the centre rod 7.

The various attachment points 18 – 20, 22, 23, 24 . - 26 enable the attachment means to be adapted to suit different implements according to their geometrical designs.

20 According to one highly preferred embodiment, respective arms 5, 6 are secured at their inner parts to the standard attachment means of respective lifting arms 1, 2 by means of cotter pins, split pins or the like 31. It is also preferred that respective arms 5, 6 project to some extent in beneath respective lifting arms 1, 2 and abut against the underside of said lifting arms, as shown in Fig. 3. This means that said pins 31 of this embodiment are the sole means required to effect attachment of the arms to the lifting arms, therewith enabling
25 the inventive loader to be secured in a very simple manner.

It will be obvious that the present invention provides an easy and inexpensive solution to the problem mentioned in the introduction.

30 Although the invention has been described above with reference to a number of embodiments thereof, it will be obvious to the person skilled in the art that the structural design of the loader can be varied.

The invention shall not therefore be considered to be limited to the above described and illustrated embodiments, since modifications can be made within the scope of the following claims.

Claims

1. A loader for agricultural tractors equipped with standard hydraulically manoeuvrable, parallel lifting arms (1, 2) which are pivotally mounted in the rear part of the tractor and provided with a centre attachment (3) in the tractor between the lifting arms, characterised in that the loader includes two parallel arms (5, 6) for attachment to respective lifting arms (1, 2) such as to extend rearwardly generally in the longitudinal direction axis of the lifting arms (1, 2); in that a centre rod (7) that can be extended hydraulically during operation extends outwardly from said centre attachment (3) parallel with the lifting arms; and in that respective arms (5, 6) and the outer end of the centre rod (7) are adapted for connection to a working implement or appliance (12).
2. A loader according to Claim 1, characterised in that the arms (5, 6) are bent upwards in a region (13, 14) outwardly of and close to the free end of respective lifting arms (1, 2).
3. A loader according to Claim 1 or 2, characterised in that respective arms (5, 6) and the outer end (8, 9; 10) of the centre rod is provided with attachment means (11) for attachment to a working implement (12).
4. A loader according to Claim 3, characterised in that the bending angle of the arms (5, 6) can be adjusted.
5. A loader according to Claim 1, 2, 3 or 4 characterised in that included at the outer end (8, 9) of respective arms (5, 6) is a joint which is adapted to pivotally support an implement (12) or an implement attachment (11); and in that included at the free end (10) of the centre rod (7) is a joint which is adapted for pivotal connection to a working implement (12).
6. A loader according to Claim 1, 2, 3, 4 or 5 characterised in that the centre rod (7) includes along its length an hydraulic piston-cylinder device (17) which functions to change the length of the centre rod.

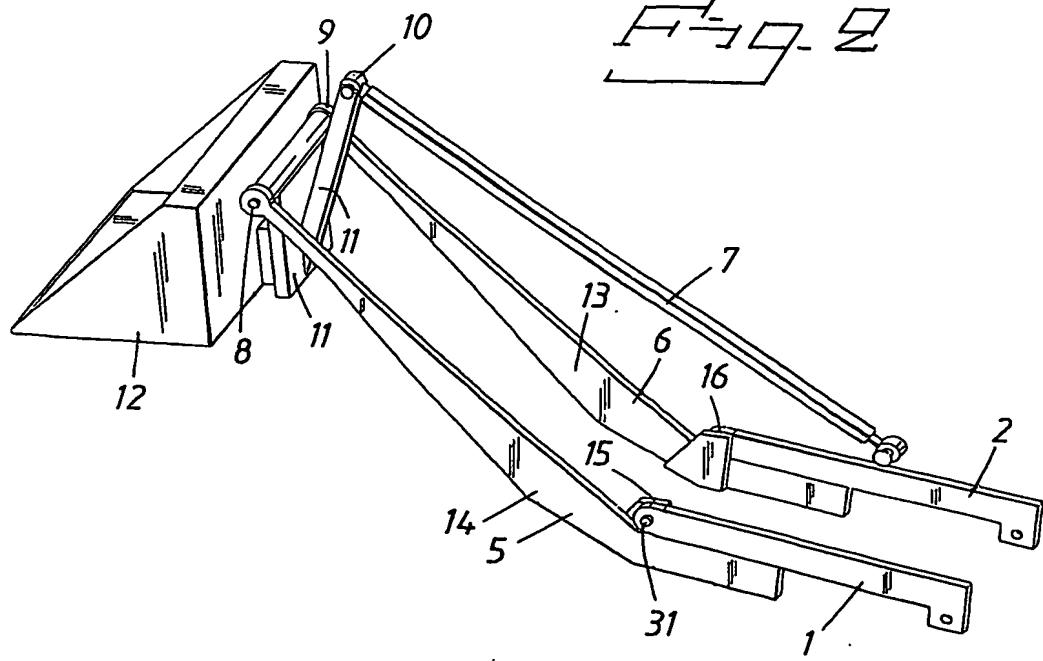
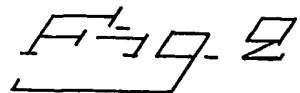
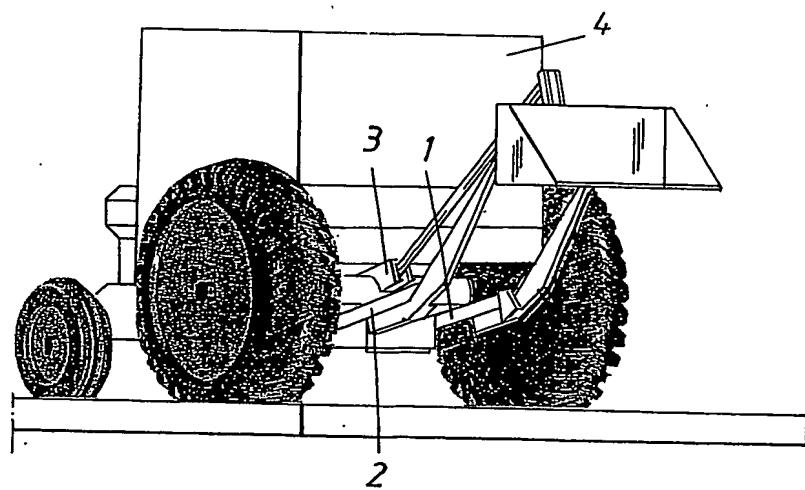
7. A loader according to Claim 1, 2, 3, 4, 5 or 6, characterised by attachment points (18 – 20, 22 23) at the free end of the centre rod (7) for co-action with an attachment means (11) or a working implement (12) at mutually different distances from the opposite end of said centre rod.

5

8. A loader according to Claim 1, 2, 3, 4, 5, 6 or 7, characterised in that respective arms (5, 6) are secured at their inner parts to the standard attachment means of respective lifting arms (1, 2) provided to this end by means of cotter pins, split pins or the like (31); and in that respective arms (5, 6) project to some extent in beneath respective lifting arms (1, 2) for abutment with the underside of respective lifting arms.

10

1 / 3



2 / 3

Fig. 3

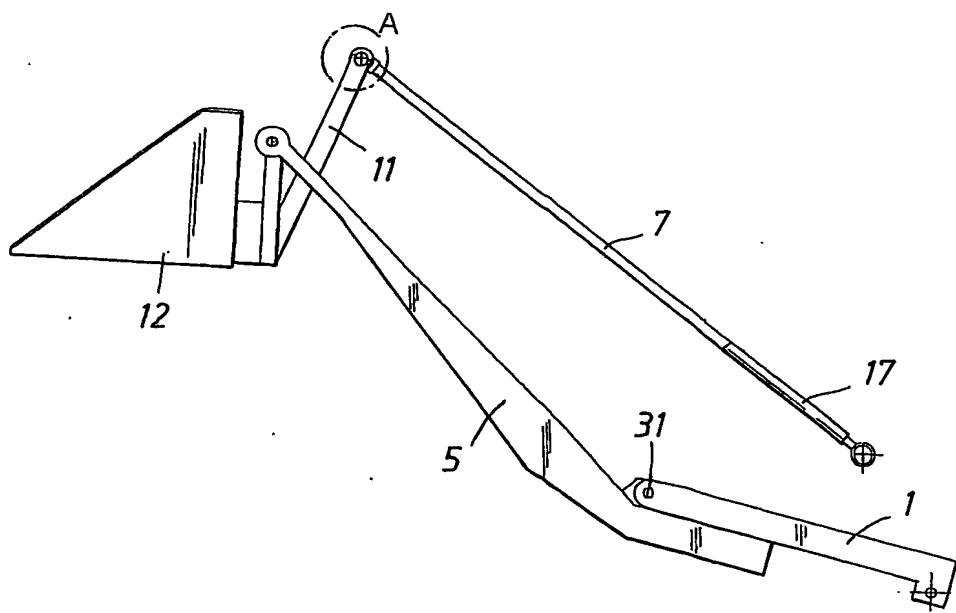
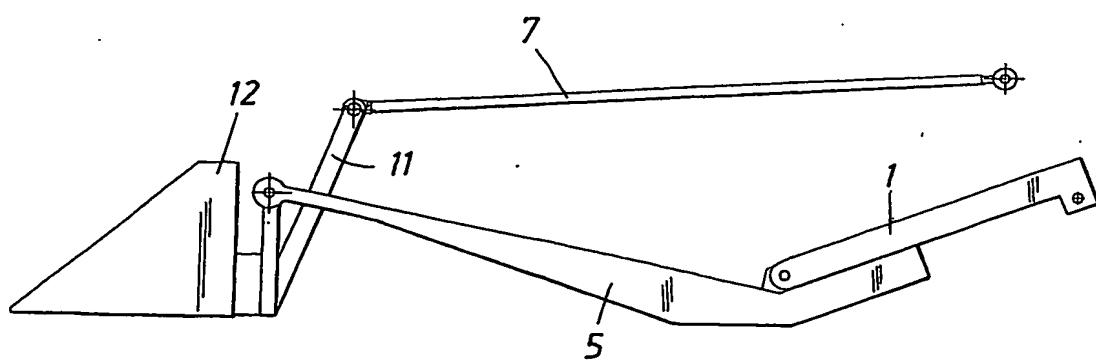
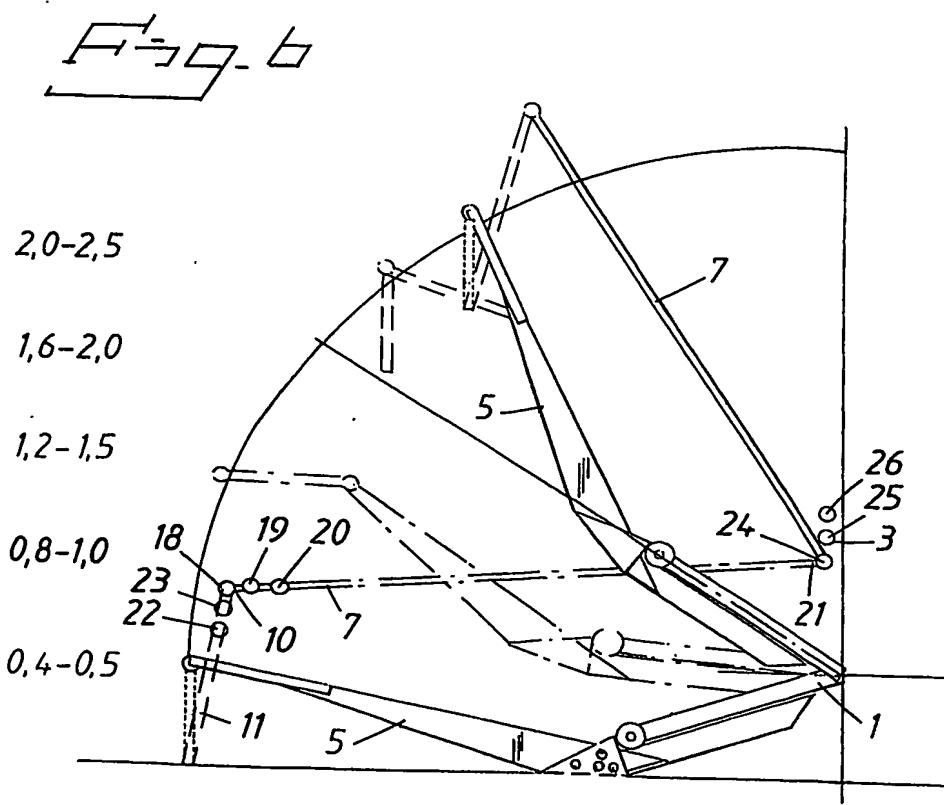
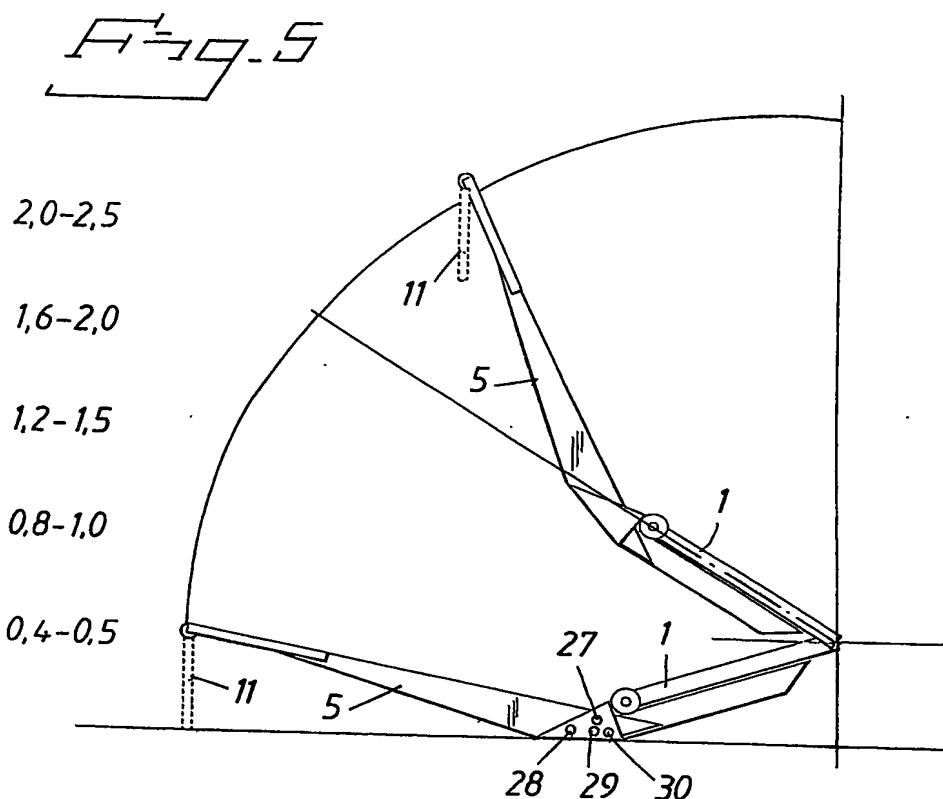


Fig. 4



3 / 3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 2003/001772

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: E03F 3/36 // E02F 3/627, A01B 63/102

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: E02F, A01B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3198357 A (E.E. SHELBY), 3 August 1965 (03.08.1965), column 5, line 33 - column 6, line 7, figures 1-3 --	1-8
A	US 4725189 A (J.W. LANGENFELD ET AL), 16 February 1988 (16.02.1988), figures 1-3, abstract --	1-8
A	US 3957167 A (C.L. JACOBSON ET AL), 18 May 1976 (18.05.1976), figures 1-5, abstract --	1-8
A	US 3260386 A (W.J. ENGSTROM), 12 July 1966 (12.07.1966), figures 1,5,7 --	1-8

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "B" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

28 January 2004

Date of mailing of the international search report

10-02-2004

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. + 46 8 666 02 86

Authorized officer

Tommy Blomberg / MRO
Telephone No. + 46 8 782 25 00

INTERNATIONAL SEARCH REPORT
Information on patent family members

24/12/2003

International application No.
PCT/SE 2003/001772

US	3198357	A	03/08/1965	NONE		
US	4725189	A	16/02/1988	NONE		
US	3957167	A	18/05/1976	NONE		
US	3260386	A	12/07/1966	GB SE	1034385 A 315246 B	29/06/1966 22/09/1969

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.